Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C.

FCC 94-178

In the Matter of	)	
	)	
Implementation of Section 309(j)	)	PP Docket No. 93-253
of the Communications Act -	)	
Competitive Bidding	)	

FIFTH REPORT AND ORDER

Adopted: June 29, 1994 Released: July 15, 1994

By the Commission: Commissioners Quello, Barrett, Ness and Chong issuing separate statements.

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I. INTRODUCTION

1. In this Fifth Report and Order, we adopt rules to conduct auctions for the award of more than 2,000 licenses to provide personal communications services in the 2 GHz band, which we call "broadband PCS." These broadband PCS auctions will constitute the largest auction of public assets in American history and are expected to recover billions of dollars for the United States Treasury. More importantly, the auctions will lead to the introduction of an array of new telecommunications products and services that are expected to fuel our nation's economic growth and revolutionize the way in which Americans communicate.

2. We also adopt in this Order provisions to fulfill Congress's mandate that we ensure that small businesses, rural telephone companies and businesses owned by minorities and women are given the opportunity to participate in the provision of broadband PCS. These rules will provide unprecedented opportunities for these designated entities to become meaningfully involved in the provision of a new telecommunications service. This action seeks to ensure that licenses for broadband PCS are disseminated to a wide variety of applicants and to remedy the serious underrepresentation of minorities and women in the provision of telecommunications services. Further, by the actions we take today we seek to ensure that PCS is provided to all communities in this country, including rural areas.

3. Broadband PCS will provide a variety of mobile services that will compete with existing cellular services. In addition, broadband PCS is expected to provide new mobile communications capabilities that are not currently available. These services will be provided by means of a new generation of communications devices that will include small, lightweight, multi-function portable phones, portable facsimile and other imaging devices, new types of multi-channel cordless phones, and advanced paging devices with two-way data capabilities.[1] The introduction of broadband PCS should benefit consumers by raising the overall level of competition in many already competitive segments of the telecommunications industry and by providing competition in other segments for the first time. The broadband PCS industry should also generate thousands of jobs in this country and improve the international competitiveness of the American economy.

4. Auctions for broadband PCS licenses will be conducted pursuant to Section 309(j) of the Communications Act, 47 U.S.C. § 309(j), which was enacted in August 1993. Section

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[1] We already have adopted rules for competitive bidding on licenses to be awarded to provide personal communications services in the 900 MHz band (narrowband PCS), which will be used primarily to provide advanced paging services, and for licenses to provide Interactive Video and Data Service (IVDS), which will be used to provide services such as home shopping and pay-per-view programming. See Third Report and Order in PP Docket No. 93-253, FCC 94-98, 9 FCC Rcd ____, released May 10, 1994 (narrowband PCS); and Fourth Report and Order in PP Docket No. 93-253, 9 FCC Rcd 2330, released May 10, 1994 (IVDS).

309(j) granted the Commission express authority to employ competitive bidding procedures to award licenses to use the electromagnetic spectrum.[2] Section 309(j)(1) permits auctions only where mutually exclusive applications for initial licenses are accepted for filing by the Commission and where the principal use of the spectrum is reasonably likely to involve the receipt by the licensee of compensation from subscribers in return for enabling those subscribers to receive or transmit communications signals. In the Second Report and Order in this proceeding, we concluded that PCS as a class of service satisfies the Section 309(j)(1) criteria. See Second Report and Order in PP Docket No. 93-253, 9 FCC Rcd 2348 (released April 20, 1994) (Second Report and Order), at ¶¶ 54-58. Accordingly, if mutually exclusive applications for a broadband PCS license are accepted for filing, we will award that license through competitive bidding.

5. We also concluded in the Second Report and Order that we could design auction procedures to govern the award of broadband PCS licenses that would promote the objectives listed in Section 309(j)(3). More specifically, in the Second Report and Order, we determined that the use of competitive bidding to award broadband PCS licenses, as compared with other licensing methods, would speed the development and deployment of new services to the public and would encourage efficient use of the spectrum, as required by Section 309(j)(3)(A) and (D). In this regard, we noted that auctions would generally award licenses quickly to those parties who value them most highly and who are therefore most likely to introduce service rapidly to the public. Id. at ¶ 57. We also concluded that competitive bidding would recover for the public a portion of the value of the spectrum, as envisioned in Section 309(j)(3)(C). Id. We considered a variety of methods to implement Congress's remaining objectives, set forth in Section 309(j)(3)(B), of "promoting economic opportunity" and "avoiding excessive concentration of licenses" by disseminating licenses "among a wide variety of applicants." In the Second Report and Order, we adopted rules which provide the Commission with a menu of options to choose from to promote these objectives with respect to particular spectrum services to be auctioned, such as broadband PCS, in service-specific rules.

6. In our Broadband PCS Reconsideration Order, we established bandwidth assignments and area designations for broadband PCS. See Memorandum Opinion and Order in GEN Docket No. 90-314, FCC 94-144, released June 13, 1994 ("Broadband PCS Reconsideration Order"); see also Second Report and Order in GEN Docket No. 90-314, FCC 93-451, 8 FCC Rcd 7700 (1993). In that Order, we allocated 120 MHz of spectrum for licensed broadband PCS. We divided the licensed broadband PCS spectrum into three

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[2] We adopted a Notice of Proposed Rule Making to implement Section 309(j) on September 23, 1993. Notice of Proposed Rule Making in PP Docket No. 93-253, 8 FCC Rcd 7635 (1993) (hereinafter "NPRM" or "Notice"). The Commission received 222 comments, 169 reply comments and numerous ex parte presentations relating to this proceeding. A list of commenters and reply commenters is attached as Appendix A to this Fifth Report and Order. Commenters may be referred to herein by the abbreviations noted in Appendix A.

30 MHz blocks (blocks A, B and C) and three 10 MHz blocks (blocks D, E and F). We also designated two different service areas: 493 Basic Trading Areas ("BTAs") and 51 Major Trading Areas ("MTAs").[3] The licenses in frequency blocks A and B will be awarded on an MTA basis, and the licenses on frequency blocks C, D, E and F will be awarded on a BTA basis. A total of 2,074 broadband PCS licenses will therefore be issued.[4] The Broadband PCS Reconsideration Order sets forth eligibility rules for obtaining broadband PCS licenses, and establishes construction requirements to facilitate the provision of PCS services. See Broadband PCS Reconsideration Order at ¶¶ 102-132, 147-158. By these rules, we intend to promote competition in the wireless telecommunications market by as many different qualified providers as the spectrum can reasonably accommodate and to promote the rapid deployment of the infrastructure required to provide broadband PCS.

II. EXECUTIVE SUMMARY

7. In this Fifth Report and Order, we set forth the specific auction procedures for broadband PCS licenses. We have decided to conduct three auctions: the first for the 99 available PCS licenses in MTA blocks A and B, the second for the 986 PCS licenses in BTA blocks C and F, and the third for the remaining 986 PCS licenses in BTA blocks D and E. That is, the first auction will award licenses for the 30 MHz blocks for large geographic areas. The second auction will award licenses for smaller geographic areas for the two blocks that, as explained below, we have reserved for bidding by relatively small companies. In these "entrepreneurs' blocks," we have designed procedures to ensure that small businesses, rural telephone companies and businesses owned by women and minorities, which we collectively refer to as designated entities, have "the opportunity to participate in the provision" of PCS, as Congress directed in Section 309(j)(4)(D). In the third auction we will award licenses for the remaining 10 MHz blocks.

8. We intend to conduct each auction through simultaneous multiple round bidding with simultaneous stopping rules. Under that approach, no license is awarded until the bidding closes on all licenses in the auction. We have determined that simultaneous multiple round bidding is appropriate where the value of the licenses is high compared to the cost of

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[3] The 493 BTAs and 51 MTAs used in our broadband PCS licensing rules have been adapted from the Rand McNally 1992 Commercial Atlas and Marketing Guide, 123rd Edition, at 38-39.

[4] The Commission has granted pioneer's preferences to three broadband PCS applicants, and stated that the parties awarded pioneer's preferences may apply for a 30 MHz MTA broadband PCS license without facing competing applications. See Third Report and Order in GEN Docket No. 90-314, 9 FCC Rcd 1337 (1994). If the Commission grants licenses to the three pioneer's preference grantees, three fewer licenses will be awarded through competitive bidding.

conducting the auction and the values of licenses are interdependent. See Second Report and Order at ¶ 106-111. We believe the former condition is met here because other government agencies project that the broadband PCS licenses will be auctioned for as much as $10.6 billion. See id. at ¶ 177. The latter condition is also satisfied because the record demonstrates, for example, that a license for the Philadelphia MTA or the Richmond MTA will likely be valued more highly if it is held in conjunction with the license for the Washington-Baltimore MTA. We are adopting a variety of rules governing bid increments and bidding activity to move the auctions toward completion in a reasonable period of time. We are also retaining the ability to use other approaches, including sequential auctions for the licenses, and to make other adjustments to the auction process as necessary.

9. As mentioned above, we establish by this Order a number of rules to implement Congress's mandate in Section 309(j)(4)(D) that we ensure that designated entities are "given the opportunity to participate in the provision of spectrum-based services" such as broadband PCS. To accomplish this objective, Congress directed us to "consider the use of tax certificates, bidding preferences, and other procedures." 47 U.S.C. § 309(j)(4)(D). We construe this congressional directive as a mandate that we take the steps that are necessary to ensure that designated entities have a realistic opportunity to obtain broadband PCS licenses. We apply that mandate in light of Metro Broadcasting, Inc. v. FCC, 497 U.S. 547, 564-565 (1990), which held that "benign race-conscious measures mandated by Congress . . . are constitutionally permissible to the extent that they serve important governmental objectives within the power of Congress and are substantially related to achievement of those objectives." The rules we adopt also further Congress's objectives, set forth in Section 309(j)(3)(B), of "promoting economic opportunity and competition and ensuring that new and innovative technologies are readily accessible to the American people by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small business, rural telephone companies, and businesses owned by members of minority groups and women." Each of the steps adopted here is directly related to carrying out Congress's stated objective of promoting economic opportunity by disseminating broadband PCS licenses to a wide variety of applicants, including designated entities.

10. The record clearly demonstrates that the primary impediment to participation by designated entities is lack of access to capital. This impediment arises for small businesses from the higher costs they face in raising capital and for businesses owned by minorities and women from lending discrimination as well. In this regard, it should be noted that although auctions have many beneficial aspects, they threaten to erect another barrier to participation by small businesses and businesses owned by minorities and women by raising the cost of entry into spectrum-based services.

11. Congress has recognized that "small business concerns, which represent higher degrees of risk in financial markets than do large businesses, are experiencing increased

difficulties in obtaining credit."[5] Congress further found that women and minorities face particularly severe problems in raising capital.[6] A study of mortgage lending conducted by the Federal Reserve Bank of Boston in 1992 illustrates how those problems arise. That study showed that in cases in which lenders exercised discretion in deciding whether to make a loan to a borrower who presented some problems (which includes most mortgage applicants), that discretion tended to be exercised in favor of whites. As a result, a minority applicant for a mortgage who was identical in all pertinent respects to a white applicant nevertheless was 60 percent more likely to be denied a mortgage loan.[7] At the same time, discrimination was difficult to show in any particular case, although it emerged clearly when data concerning hundreds of mortgage applications were reviewed.

12. The first measure we adopt to fulfill Congress's mandate that we ensure that designated entities have the opportunity to participate in providing broadband PCS is to reserve the 30 MHz licenses on block C and the 10 MHz licenses on block F, both of which are to be licensed in each of the 493 BTAs, for bidding by entities with annual gross revenues of less than $125 million and total assets of less than $500 million. These limits will exclude many large telecommunications companies from bidding on these two blocks. We will not allow one entity to obtain more than 10 percent (i.e., 98) of the licenses on these two blocks. By excluding large companies from bidding in these two blocks and by limiting the total number of licenses that one entity can obtain in these blocks we create numerous opportunities for smaller entities to become PCS providers and thereby ensure that broadband PCS licenses will be disseminated "among a wide variety of applicants," as required by Section 309(j)(3)(B).

13. Reserving blocks C and F for bidding by relatively small companies will not, by itself, be sufficient to ensure that small businesses and businesses owned by members of minority groups and women have the opportunity to obtain broadband PCS licenses. Under the definition we apply for purposes of this Order, "small businesses" are those with gross revenues not exceeding $40 million, and those businesses will be at a disadvantage in competing against companies with gross revenues of as much as $125 million. In addition, businesses owned by members of minority groups and women face discrimination that poses additional obstacles for these firms. Accordingly, we take five related steps within the entrepreneurs' blocks to assist designated entities in attracting the capital necessary to obtain a broadband PCS license.

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[5] Small Business Credit and Business Opportunity Enhancement Act of 1992, Section 331(a)(3), Pub. L. 102-366, Sept. 4, 1992.

[6] Id. Sections 112(4) and 331(a)(4).

[7] Mortgage Lending in Boston: Interpreting HMDA Data, Federal Reserve Bank of Boston, Working Paper 92-7 (October 1992).

14. First, we will structure our attribution rules to allow those extremely large companies that may not bid on blocks C and F to invest in entities that bid on those blocks. More specifically, we will allow the relatively small companies eligible to bid in these blocks to obtain investment representing up to 75 percent of their passive equity from larger companies so long as each investor holds no more than a 25 percent passive equity interest. In addition, eligible businesses owned by minorities and women may choose to have a single investor, no matter how large, hold a passive equity interest up to 49.9 percent. These rules, and others that we establish in this Order, are designed to enhance access to capital by businesses owned by minorities and women.

15. Second, to encourage large companies to invest in designated entities and to assist designated entities without large investors to overcome the additional hurdle presented by auctions, we will make bidding credits available to designated entities. More specifically, small businesses will receive a 10 percent bidding credit (or a 10 percent discount on their winning bids). Businesses owned by minorities and women will receive a 15 percent bidding credit to compensate for the substantial problems they face in attracting capital. The credits will be cumulative, so that a business owned by minorities or women that also qualifies as a small business will receive a 25 percent bidding credit. Under these rules, it still will be more expensive for designated entities to participate in the provision of spectrum-based services than it was before Congress granted us authority to hold auctions, because they will have to purchase licenses. But by adopting bidding credits, which are explicitly authorized by Section 309(j)(4)(D), the Commission seeks to promote economic opportunity and to counterbalance the tendency of auctions to concentrate license ownership in the hands of several very large companies.

16. Third, we will allow most successful bidders within the entrepreneurs' blocks to pay for their licenses in installments for generally the same reasons -- encouraging large companies to invest in designated entities, promoting economic opportunity by assisting designated entities in overcoming the additional hurdle presented by auctions, and ensuring that licenses are disseminated widely. In general, successful bidders will be permitted to defer payments of principal on their debt to the government for some period. Small businesses and businesses owned by minorities and women will be permitted to defer payments of principal for a longer period than other successful bidders in these blocks. Finally, businesses owned by minorities and women will be charged a lower interest rate.

17. Fourth, we will extend our tax certificate policies to promote participation by minorities and women in the provision of broadband PCS. The holder of a tax certificate is permitted to defer payment of the capital gains tax that would otherwise be recognized upon the sale of an investment. Our extension of the tax certificate policy to broadband PCS will promote involvement by minorities and women in spectrum-based services in three ways. First, initial investors in such businesses will be eligible for tax certificates upon the sale of their investments. We expect that the availability of such favorable tax treatment will enable minority and woman-owned businesses to attract investors more easily. Second, holders of broadband PCS licenses will be able to obtain tax certificates upon the sale of the business to

a company controlled by minorities and women. Third, a cellular operator that sells its interest in an overlapping cellular system to a minority or woman-owned business to come into compliance with our PCS/cellular cross-ownership rule will be eligible for a tax certificate. Both the second and third policy will further Congress's objective of ensuring that spectrum licenses are disseminated widely and, in particular, to designated entities.

18. Finally, we will reduce the upfront payment for all bidders in the entrepreneurs' block. Bidders in the other blocks will pay $0.02 per MHz per pop while winners in the entrepreneurs' blocks will receive a 25 percent discount and pay only $0.015 per MHz per pop as a pre-auction payment.

19. Congress was also concerned that rural areas not go unserved by PCS, and therefore directed us to ensure participation in auctions for spectrum-based services by rural telephone companies who have a history of service to rural areas and an established infrastructure on which to build a PCS business effectively. Thus, we establish partitioning rules in this Order that will allow them to use their existing wireline network to efficiently and expeditiously provide PCS in rural areas. In addition, most rural telephone companies will qualify to bid on the entrepreneurs' blocks, and hence will be eligible for installment payments. Those rural telephone companies that qualify as small or minority or women-owned businesses will also be able to take advantage of the applicable bidding credits.

20. The rules that we adopt today are designed to ensure that only bona fide designated entities qualify for the special provisions established to ensure their participation in broadband PCS. The rules are designed to enable designated entities to attract passive equity from non-designated entities, provided that designated entities maintain control and a substantial equity stake in the ventures at all times. The Commission will not tolerate "fronts" that are controlled by supposedly passive investors, and we will be vigilant in preventing abuse of the designated entity provisions. Our rules are also designed to prevent designated entities from assigning licenses obtained through the use of these special measures or who otherwise lose their designated entity status before the end of a required five-year holding period.

21. The following sections of this Fifth Report and Order discuss in detail the actions we have outlined above.

III. AUCTIONABILITY OF BROADBAND PCS

22. Section 309(j)(1) of the Communications Act, as amended, 47 U.S.C. § 309(j)(1), permits auctions only where mutually exclusive applications for initial licenses or construction permits are accepted for filing by the Commission and where the principal use of the spectrum will involve or is reasonably likely to involve the receipt by the licensee of compensation from subscribers in return for enabling those subscribers to receive or transmit communications signals. In the Second Report and Order, we concluded that PCS as a class

of service would satisfy the Section 309(j)(1) criteria for auctionability. See Second Report and Order at ¶¶ 54-58. Specifically, based on the record in this proceeding and in GEN Docket No. 90-314, we concluded that the principal use of broadband PCS spectrum satisfied these auction criteria Id. at ¶ 56. Thus, if mutually exclusive applications for a broadband PCS license are accepted for filing, we will award that license through competitive bidding.[8]

23. As noted above, we concluded in the Second Report and Order that the criteria in Section 309(j)(3) will be satisfied by competitive bidding for broadband PCS licenses, and thus that broadband PCS should be subject to our competitive bidding procedures. We determined that the use of competitive bidding to award broadband PCS licenses, as compared with other licensing methods, will speed the development and deployment of new services to the public with minimal administrative or judicial delay, and will encourage efficient use of the spectrum as required by Section 309(j)(3)(A) and (D). We also concluded that competitive bidding would recover for the public a portion of the value of the spectrum, as envisioned in Section 309(j)(3)(C). Id. Finally, in accordance with Section 309(j)(3)(B), we adopted a set of open competitive bidding procedures and a menu of special provisions designed to increase opportunities for designated entities who might otherwise face entry barriers. Our views on this matter remain unchanged since adoption of the Second Report and Order. We therefore affirm in this Order the use of competitive bidding procedures to award broadband PCS licenses.

IV. COMPETITIVE BIDDING DESIGN

A. General Competitive Bidding Rules

24. The Second Report and Order established the criteria to be used in selecting which auction design method to use for each particular auctionable service. Generally, we concluded that awarding licenses to those parties who value them most highly will foster Congress's policy objectives. In this regard, we noted that since a bidder's ability to

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[8] In the Second Report and Order, we addressed the only commenter who argued that the Commission should not find that the principal use of PCS is likely to be for the provision of service to subscribers for compensation. See Second Report and Order at ¶¶ 55-56. The Commission rejected the argument of Millin Publications, a publisher of specialized information services that intends to utilize PCS frequencies on a non-subscription basis, that the Commission should refrain from making the principal use finding because PCS does not yet exist. We concluded that the overwhelming weight of the comments in this proceeding, as well as our experience with the PCS experiments that we have licensed, reflect that licensed PCS spectrum is likely to be used principally for the provision of service to subscribers for compensation. See id. at ¶ 56. We find no basis in the record to depart from this conclusion.

introduce valuable new services and to deploy them quickly, intensively, and efficiently increases the value of a license to that bidder, an auction design that awards licenses to those bidders with the highest willingness to pay tends to promote the development and rapid deployment of new services and the efficient and intensive use of the spectrum. In articulating our auction design principles we further stated that: (1) licenses with strong value interdependencies should be auctioned simultaneously; (2) multiple round auctions, by providing bidders with information regarding other bidders' valuations of licenses, generally will yield more efficient allocations of licenses and higher revenues, especially where there is substantial uncertainty as to value; and (3) because they are relatively expensive to implement and time-consuming, simultaneous and/or multiple round auctions become less cost-effective as the value of licenses decreases. See Second Report and Order at ¶ 69.

25. Based on the foregoing, we concluded that where the licenses to be auctioned are interdependent and their value is expected to be high, simultaneous multiple round auctions would best achieve the Commission's goals for competitive bidding. See Second Report and Order at ¶¶ 109-111. We indicated that compared with other bidding mechanisms, simultaneous multiple round bidding will generate the most information about license values during the course of the auction and provide bidders with the most flexibility to pursue back-up strategies. Thus, we concluded that simultaneous multiple round bidding is most likely to award interdependent licenses to the bidders who value them the most. We also indicated that this method will facilitate efficient aggregation of licenses across spectrum bands, thereby resulting in vigorous competition among several strong service providers who will be able rapidly to introduce a wide variety of services highly valued by end users. Second Report and Order at ¶ 106. In addition, we concluded that because of the superior information and flexibility it provides, this method is likely to yield greater revenues than other auction designs. Thus, we found that the use of simultaneous multiple round auctions would generally be preferred. Id.

26. However, because simultaneous multiple round bidding is likely to be more administratively complex and costly both for bidders and for the FCC than sequential or single round bidding, we indicated that we would use this auction design only where license values are interdependent and the expected value of the licenses to be auctioned is high relative to the costs of conducting a simultaneous multiple round auction. See Second Report and Order at ¶¶ 110-111.

B. Competitive Bidding Design for Broadband PCS Licenses

27. In the Second Report and Order we considered several auction methods including simultaneous multiple round bidding, sequential bidding, and combinatorial bidding. We discuss each of these below. We have chosen to adopt simultaneous multiple round auctions as our auction methodology for broadband PCS licenses. We believe that for broadband licenses this method will best meet Congress's goals in authorizing competitive bidding in Section 309(j) of the Communications Act.

1. Simultaneous Multiple Round Auctions

28. There is considerable support in the record for the use of simultaneous multiple round auctions, in which two or more licenses are put up for bid at the same time, and there are multiple bidding rounds in which bidders have the opportunity to top the high bids from the previous round. Several comments and studies in the record by academic auction experts advocate simultaneous multiple round bidding for broadband PCS. See comments of PacTel Corporation, Attachment of R. Preston McAfee; comments of Pacific Bell and Nevada Bell, Attachment of Paul R. Milgrom and Robert B. Wilson; comments of NYNEX, Attachment by Robert G. Harris and Michael L. Katz. NTIA also recommends simultaneous multiple round bidding.[9] Comments of NTIA at 14-16. Other experts recommend using some combination of sequential and simultaneous bidding. See comments of Bell Atlantic Personal Communications, Inc., Attachment by Barry Nalebuff and Jeremy Bulow; and comments of Telephone and Data Systems, Attachment by Robert J. Weber. Some commenters who originally expressed no opinion on the issue or supported other methods in their comments supported proposals for simultaneous bidding in their reply comments. See reply comments of AT&T, GTE Service Corp. and Community Service Telephone Co.

29. The analysis in the Second Report and Order also supports simultaneous multiple round bidding for broadband PCS auctions. We concluded that multiple round bidding is generally superior to single round bidding, and that when licenses are interdependent, simultaneous bidding is generally superior to sequential bidding. As we noted in the Second Report and Order, multiple-round auctions have the advantage over single-round auctions insofar as they provide more information to bidders about the value that other bidders place on licenses, increasing the likelihood that the licenses are acquired by those who value them most highly and increasing the revenue likely to be gained from the auction. Multiple-round auctions are also more likely to be perceived as open and fair. The disadvantage of multiple round auctions is that they have higher administrative costs than single round auctions. Second Report and Order at ¶¶ 82-85.

30. As noted in the Second Report and Order, simultaneous auctions are more likely than sequential auctions to award interdependent licenses efficiently because they provide more information about the value of interdependent licenses and allow the use of that information because all licenses remain available throughout the bidding process. Simultaneous auctions are also likely to raise more revenue than sequential auctions for two reasons. First, they increase the value of the licenses by facilitating efficient aggregation. Second, because they provide more information about the value of interdependent licenses they reduce the propensity of sophisticated bidders to bid cautiously in order to avoid the "winner's curse" -- the tendency for the winner to be the bidder who most overestimates the value of the item up for bid. Simultaneous auctions also eliminate the need to choose the

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[9] NTIA also supports all-or-nothing bids on groups of licenses, i.e., combinatorial bidding, in conjunction with simultaneous multiple round bidding.

order in which licenses will be auctioned. The advantage offered by simultaneous auctions depends on how much interdependence exists among licenses. Second Report and Order at ¶¶ 89-94. The disadvantages of simultaneous multiple round auctions appear to be that they may be difficult to implement and there is little experience in their use. Second Report and Order at ¶ 95.

31. We agree with commenters who support simultaneous multiple round bidding for awarding broadband PCS licenses. Estimates of total PCS revenues by the Office of Management and Budget and the Congressional Budget Office indicate that the value of broadband PCS licenses will likely be sufficiently high to warrant the use of simultaneous auctions.[10] We further believe that the values of most broadband PCS licenses will be significantly interdependent because of the desirability of aggregation across spectrum blocks and geographic regions and because there is a high degree of substitutability among licenses with the same amount of spectrum and covering the same geographic area. See Second Report and Order at ¶¶ 90-91. Compared with other bidding mechanisms, simultaneous multiple round bidding generates the most information about license values during the course of the auction and provides bidders with the most flexibility to pursue back-up strategies, and is therefore most likely to award licenses to the bidders who value them the most. Simultaneous multiple round auctions will also facilitate efficient aggregation across spectrum bands, where permitted, thereby enhancing competition among wireless products and services.

32. We recognize, however, that simultaneous multiple round bidding may involve a greater degree of complexity than other competitive bidding methods, and that it may present greater operational difficulties both for the FCC and for bidders, especially where many bidders are expected to participate. Therefore, we will use a sequence of simultaneous auctions. Licenses that are highly interdependent will be grouped together and auctioned simultaneously.

2. Sequential Auctions

33. In a pure sequential auction, whether oral or electronic, licenses are put up for bid one at a time, so that bidding ends on one item before it begins on the next item. Sequential multiple round oral or electronic auctions generate valuable information about earlier auctioned licenses, which can assist bidders in valuing later auctioned licenses. If license values are interdependent, however, sequential oral or electronic auctions are less likely than simultaneous auctions to award interdependent licenses to the parties who value them most

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[10] A study by the Congressional Budget Office estimated that an auction for PCS licenses on two 25 MHz nationwide blocks of spectrum could raise $1.3 billion to $5.7 billion in revenues. Congressional Budget Office, *Auctioning Radio Spectrum Licenses,* at 23 (March 1992). The Office of Management and Budget estimated that auctioning broadband PCS licenses would generate $12.6 billion in revenues. *Budget of the United States Government, Analytical Perspectives, Fiscal Year 1995*, at 220 (February 1994).

highly and to result in the efficient aggregation of licenses, because bidders for licenses that are auctioned early must bid with less information about the value of licenses to be auctioned later, and they will have less opportunity to pursue backup bidding strategies. For these reasons, we conclude that sequential multiple round auctions are less preferred in the award of broadband PCS licenses than simultaneous multiple round auctions. Nevertheless, if, as a result of our auction experience, we determine that the operational costs or complexities associated with simultaneous multiple round auctions outweigh their benefits, we may decide instead to employ pure sequential oral or electronic (multiple round) auctions or a sequence of single combined oral auctions in which bidding is combined for all licenses in a given band with the same bandwidth and the same geographic service area. If such a change becomes necessary, the auction method will be announced by Public Notice before each auction.

34. If we should decide in the future to use sequential oral or sequential electronic bidding for relatively homogeneous licenses, we will employ a single combined auction design. Under this approach, the Commission will combine bidding for all licenses in the same band with the same amount of spectrum and same geographic service area.[11] Licenses will be awarded market by market to the highest bidders until all the available licenses are exhausted, e.g., two relatively homogeneous licenses would be awarded to the two highest bidders. Because broadband PCS licenses may not be perfectly homogeneous (i.e., bidders may prefer one frequency over another within the same geographic region for purposes of efficient aggregation), winning bidders will be given the opportunity to choose among licenses for which bidding is combined in descending order of their bid amounts (i.e., the highest bidder will pick first).

3. Combinatorial Bidding

35. In general terms, combinatorial bidding allows bidders to bid for multiple licenses as all-or-nothing packages.[12] Combinatorial bidding can be implemented with either simultaneous or sequential auction designs. Although we recognized in the Second Report and Order that there may be significant benefits associated with combinatorial bidding,

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[11] This approach was proposed by Bell Atlantic. See comments of Bell Atlantic Personal Communications Inc., Attachment by Barry Nalebuff and Jeremy Bulow at 4-5. Single combined auctions are used by the U.S. Department of the Treasury to sell U.S. securities.

[12] In combinatorial bidding, if a bid for a group of licenses exceeds the sum of the highest bids for the individual licenses that comprise the package, then the package bid would win. In the Second Report and Order we also indicated that if we were to utilize combinatorial bidding we might institute a premium so that the combinatorial bid would win only if it exceeded the sum of the bids for individual licenses by a set amount. See Second Report and Order at ¶ 114. NTIA is the main advocate of combinatorial bidding. See comments of NTIA, and ex parte submission of NTIA in PP Docket No. 93-253, February 28, 1994.

especially in terms of efficient aggregation of licenses, we concluded that simultaneous multiple round auctions offer many of the same advantages without the same degree of administrative and operational complexity and without biasing auction outcomes in favor of combination bids. See Second Report and Order at ¶¶ 101-105. On balance, we believe that the advantages of combinatorial bidding appear unlikely to outweigh the disadvantages. While broadband PCS licenses are likely to be worth more to some bidders as a part of a package, we believe that simultaneous multiple round bidding will provide these bidders with ample opportunity to express the value of interdependent licenses. Moreover, we conclude that there will not be any extreme discontinuity in value if some licenses in a package are not obtained. We believe that the opportunity to acquire licenses in post-auction transactions and the ability to withdraw bids (upon payment of the bid withdrawal penalty) will limit the risks associated with failing to acquire all of the licenses in a desired package. Nevertheless, if, based on our experience with the initial simultaneous multiple round auctions and auction experiments, we determine that such auctions do not result in efficient aggregation of licenses, and if there are significant advances in the development of combinatorial auctions, we may, by public notice prior to a specific auction, choose to use combinatorial bidding techniques in conjunction with simultaneous multiple round auctions.

C. Bidding Procedures

1. Grouping of Licenses

36. In the Second Report and Order, the Commission concluded that highly interdependent licenses should be grouped together and put up for bid at the same time in a multiple round auction. See Second Report and Order at ¶¶ 106-107. This will facilitate awarding licenses to the bidders who value them most highly because it will provide bidders information about the prices of complementary and substitutable licenses while such licenses are still up for bid. The magnitude of the benefit of auctioning a group of licenses together in a simultaneous multiple round auction increases with the degree of interdependence among the licenses. On the other hand, the Second Report and Order also noted that the cost and complexity, both for the FCC and for bidders, of auctioning a very large number of interdependent licenses simultaneously may outweigh the informational and bidding flexibility advantages. See Second Report and Order at ¶ 107. Accordingly, although we believe that all broadband PCS licenses are interdependent, we will not auction them all simultaneously. Instead, we will divide the licenses into three groups by combining those licenses that are most closely related so that there will be limited interdependence across groups. Then we will sequentially conduct a separate simultaneous multiple round auction for each group. We formed the three groups in two conceptual steps. First, we separated the "entrepreneurs'" blocks (C and F) from all other blocks.[13] Then, we separated the large unrestricted blocks (A and B, with 30 MHz of spectrum and MTA geographic scope) from the small ones (D and E,

[13] As explained in more detail below, we establish economic eligibility criteria for bidders in blocks C and F.

with 10 MHz of spectrum and BTA geographic scope).

37. In the first auction, the 99 available MTA licenses in blocks A and B will be put up for bid. In the second auction, the 986 BTA licenses in blocks C and F will be put up for bid. And in the last auction, the 986 BTA licenses in blocks D and E will be put up for bid. As explained below, we believe that this grouping strikes a proper balance among the competing concerns of awarding licenses to the parties who value them most highly, keeping the auction process simple and manageable, minimizing administrative delay, and fostering designated entity participation.

38. Separating the entrepreneurs' blocks (C and F) from all other blocks entails little loss of efficiency because most firms are likely to be interested in licenses in either the entrepreneurs' blocks or the non-restricted blocks, but not both. Large firms cannot bid on entrepreneurs' licenses, although they may partner with firms that can. Small firms can bid on all blocks, but are likely to be most interested in the entrepreneurs' blocks because on these blocks they would not be placed in the position of bidding against large firms.

39. In addition to reducing the complexity of the auctions, auctioning block C licenses after the block A and B licenses is likely to further another objective of auction design -- fostering designated entity participation -- by enabling designated entities to more easily attract partners. Many potential partners may be unwilling to commit themselves to a partnership arrangement with designated entities prior to the auction of licenses on the A and B blocks. So, designated entities that are unable to raise independent financing for at least the required upfront and down payments may have difficulty participating in an auction in which block C is put up for bid simultaneously with blocks A and B. If, however, block C is auctioned after blocks A and B, we expect that non-designated entities who are unsuccessful in acquiring MTA licenses on blocks A and B will want to become partners with or make investments in designated entities so as to gain an interest in 30 MHz licenses on block C. In addition, the auction on blocks A and B will produce price information that would be valuable to designated entities in their business planning.

40. The efficiency loss associated with separating the large unrestricted blocks (A and B) from the small ones (D and E) depends on the degree of substitutability and complementarity between licenses in these two groups. Auctioning licenses on the D and E blocks separately from those on the A and B blocks may make it more difficult for bidders to pursue a back-up strategy of combining two 10 MHz licenses in the same geographic areas as an alternative to acquiring 30 MHz licenses in the A or B blocks. We believe, however, that this is not likely to be a widely used strategy, because the licenses are defined on a BTA basis while the licenses on the A and B blocks are defined on a MTA basis. It is also possible that some bidders may wish to combine a 10 MHz license with a 30 MHz license in the same geographic area. Although this approach would be easier to pursue if blocks A, B, D and E were auctioned together, we believe that in most cases the amount bidders would be willing to pay for a block A or B license would not be strongly affected by whether they were able to acquire a complementary block D or E license. So auctioning blocks D and E

after blocks A and B would not significantly hinder combining 30 MHz and 10 MHz licenses. We conclude that the benefits of administrative simplicity from auctioning licenses on blocks A and B separately from those on blocks D and E are likely to outweigh the possible loss of efficiency.

2. Bid Increments

41. In using simultaneous multiple round auctions to award broadband PCS licenses, it is important to specify minimum bid increments.[14] The bid increment is the amount or percentage by which the bid must be raised above the previous round's high bid in order to be accepted as a valid bid in the current bidding round. The application of a minimum bid increment speeds the progress of the auction and, along with activity and stopping rules, helps to ensure that the auction comes to closure within a reasonable period of time. Establishing an appropriate minimum bid increment is especially important in a simultaneous auction with a simultaneous closing rule. In that case, all markets remain open until there is no bidding on any license, and a delay in closing one market will delay the closing of all markets.

42. Because we plan to use simultaneous multiple round auctions to award broadband PCS licenses, we believe that it is necessary to impose a minimum bid increment to ensure that the broadband PCS auctions conclude within a reasonable period of time. Commenters addressing the issue generally supported a minimum bid increment of 5 percent. PacTel, for example, argues that this amount will provide a reasonable compromise between the goal of completing the auction quickly and that of revealing information about the distribution of valuations among bidders.[15] As we recognized in the Second Report and Order, it is important in establishing the amount of the minimum bid increment to express such increment as the greater of a percentage and fixed dollar amount. See Second Report and Order at ¶ 126. This will ensure a timely completion of the auction even if bidding begins at a very low dollar amount. Accordingly, we will impose a minimum bid increment of some percentage of

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[14] See Second Report and Order at ¶¶ 124-126. Commenters who addressed the issue supported minimum bid increments. See comments of Telephone and Data Systems, Inc. at 24; comments of PacTel Corporation, Attachment of R. Preston McAfee at 16, 18; comments of Pacific Bell and Nevada Bell, Attachment of Paul R. Milgrom and Robert B. Wilson at 19; reply comments of Telephone and Data Systems, Inc., Attachment of Robert J. Weber at 11; reply comments of PacTel Corporation, Attachment of R. Preston McAfee at 10; reply comments of Pacific Bell and Nevada Bell, Attachment of Paul Milgrom and Robert Wilson, Appendix at 8, 9.

[15] See comments of PacTel, Exhibit by R. Preston McAfee, *Auction Design for Personal Communications Services* at 16. Milgrom and Wilson also recommend a minimum bid increment of 5 percent (subject to a dollar minimum and maximum) for stage I of the auction, and smaller percentages for stages II and III. Reply comments of PacBell, Attachment of Paul Milgrom and Robert Wilson, Appendix at 8, 9.

the high bid from the previous round or a dollar amount per MHz per pop, whichever is greater, in broadband PCS auctions where multiple round bidding is used.[16]

43. PacTel also suggests, in the context of simultaneous auctions, that the Commission should vary the bid increment, reducing it as the number of active bidders declines.[17] Similarly, PacBell suggests that the bid increment depend on the stage of the auction, with a 5 percent increment in stage I, 2 percent in stage II, and 1 percent in stage III.[18] This would move the auction quickly at the beginning, when prices have limited informational content and there is little benefit to either bidders or the Commission of refined price movements, while allowing bidders to express small differences in valuations as the auction nears a close, increasing both efficiency and auction revenues. Small bid increments also reduce the chances of ties. Where a tie does occur, the high bidder will be determined by the order in which the bids were received by the Commission.[19]

44. Accordingly, we will start the auction with large bid increments, and reduce the increments as bidding activity falls. The minimum bid increment in stage I of the auction will be 5 percent of the high bid in the previous round or $.02 per MHz per pop, whichever is greater.[20] We will reduce the minimum bid increment as we move through the auction stages, with a minimum bid increment of the greater of 2 percent or $.01 per MHz per pop in

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[16] "Pop" refers to each member of the population of the license service area and "MHz" refers to the amount of spectrum, in megahertz, that the licensee is permitted to use. For example, for a 30 MHz license with a population of 10 million, if the minimum bid increment were the greater of 5 percent or $0.02 per MHz per pop, the minimum bid increment would be $6 million ($0.02 x 30 MHz x 10,000,000) when the high bid from the previous round is less than $120 million. If the high bid from the previous round exceeds $120 million, the minimum bid would be 5 percent of the value of that bid (since 5 percent of a bid over $120 million is greater than $6 million).

[17] See comments of PacTel, Exhibit by R. Preston McAfee, *Auction Design for Personal Communications Services*, at 18.

[18] See reply comments of PacBell, Appendix to Exhibit by Paul Milgrom and Robert Wilson, *Auction Rules and Procedures*, at 8-9. For a discussion of auction stages in simultaneous multiple round auctions see the section on activity rules infra.

[19] See Second Report and Order at ¶ 125.

[20] $0.02 per MHz per pop would represent almost 6 percent of the value of a license based on an extrapolation from the $10.6 billion estimated value of the 120 MHz of broadband PCS spectrum to be licensed. See Second Report and Order at ¶ 177.

stage II, and the greater of 1 percent or $.005 per MHz per pop in stage III.[21] The Commission, however, retains the discretion in broadband PCS auctions to set and, by announcement before or during the auction, vary the minimum bid increments for individual licenses or groups of licenses over the course of an auction if the auction is not moving at an appropriate pace.

45. In addition, the Commission will establish a suggested minimum bid on each license. Bids below the suggested minimum bid will count as activity under the activity rule (see infra) only if no bids at or above the suggested minimum bid are received. Initial bids must be above the minimum bid increment of $.02 per MHz per pop, but may be below the suggested minimum bid. Once a bid has been received on a license, the suggested minimum bid is no longer applicable in subsequent rounds. The amount of the suggested minimum bid may vary by market size, with a larger minimum bid in larger markets, and will be announced by public notice prior to each auction. We will establish suggested minimum bids at no less than $.05 per MHz per pop and no more than $.20 per MHz per pop. The suggested minimum bid provides bidders an incentive to start bidding at a substantial fraction of the final prices of licenses, thus ensuring a rapid conclusion of the auction, while still allowing for bidding on licenses whose market values are below the suggested minimum bids.[22]

3. Stopping Rules for Multiple Round Auctions

46. We also noted in the Second Report and Order that with multiple round auctions a stopping rule must be established for determining when the auction is over.[23] In

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[21] In oral or electronic sequential auctions the auctioneer may within his or her sole discretion establish and vary the amount of the minimum bid increment in each round of bidding.

[22] If the Commission were to preclude bidding below a starting minimum bid, a bidder who is interested in only a single license for which the minimum bid is set above the market value would be forced to use an activity rule waiver or drop out of the auction under the activity rules adopted infra.

[23] See Second Report and Order at ¶ 127. Commenters agreed on the importance of the appropriate stopping rule. PacTel proposes that bidding on an individual license close if there are no new bids on that license within a given round, or if there are fewer than two bids greater than a "suggested minimum bid." Comments of PacTel, Attachment of R. Preston McAfee at 16-18. Pacific Bell recommends simultaneous closing of bidding on all licenses when there are no new acceptable bids on any license. Comments of PacBell, Attachment of Paul Milgrom and Robert Wilson at 19; reply comments of PacBell, Attachment of Paul Milgrom and Robert Wilson, Appendix at 5. Bell Atlantic Personal Communications, on the other hand, asserts that in simultaneous auctions, no stopping rule can prevent strategic delays. They provide no evidence for this, however, and do not discuss any closing rule in

simultaneous multiple round auctions, bidding may close separately on individual licenses, simultaneously on all licenses, or a hybrid approach may be used. Under an individual, license-by-license approach, bidding closes on each license after one round passes in which no new acceptable bids are submitted for that particular license. With a simultaneous stopping rule, bidding remains open on all licenses until there is no new acceptable bid on any license. This approach has the advantage of providing bidders full flexibility to bid for any license as more information becomes available during the course of the auction, but it may lead to very long auctions, unless an activity rule (see discussion infra) is imposed. A hybrid approach combines the first two stopping rules. For example, we may use a simultaneous stopping rule (along with an activity rule designed to expedite closure for licenses subject to the simultaneous stopping rule) for the higher value licenses. For lower value licenses, where the loss from eliminating some back-up strategies is less, we may use simpler license-by-license closings. In the Second Report and Order we recognized that such a hybrid approach might simplify and speed up the auction process without significantly sacrificing efficiency or expected revenue. Id.

47. For broadband PCS we believe that a simultaneous stopping rule is preferable for all MTA licenses. MTA licenses are expected to have relatively high values and are fewer in number than BTA licenses, which will reduce the complexity of implementing a simultaneous stopping rule. Since we intend to impose an activity rule (as discussed below), we believe that allowing simultaneous closing for all licenses will afford bidders flexibility to pursue back-up strategies without running the risk that bidders will hold back their bidding until the final rounds. We also intend to use a simultaneous stopping rule for BTA licenses. However, because of the large number of BTA licenses, we retain the discretion either to use a hybrid stopping rule or to allow bidding to close individually for these licenses if as we gain experience with auctions we determine that simultaneous stopping rules are too complex to implement for very large numbers of licenses. The specific stopping rule for ending bidding on BTA licenses will be announced by Public Notice prior to auction.

48. In addition, we will retain the discretion to declare at any point after 40 rounds in a simultaneous multiple round auction that the auction will end after some specified number of additional rounds.[24] This gives the Commission a means to prevent bidders from

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detail. In discussing the Milgrom-Wilson closing rule they fail to account for the Milgrom-Wilson activity rule, which will reduce the likelihood of delay, and the fail-safe closing mechanism proposed by Milgrom and Wilson. Reply comments of Bell Atlantic Personal Communications, Inc., Attachment of Barry J. Nalebuff and Jeremy I. Bulow at 12.

[24] PacBell proposed that in case of inordinate delays in the auction the Commission should have the ability to conclude the auction at any time after 40 rounds by issuing a call for final bids on the following business day for each of those licenses for which the highest bid increased in at least 1 of the preceding 3 rounds. See reply comments of PacBell, Attachment of Paul Milgrom and Robert Wilson, Appendix at 5.

continuing to bid on a few low value licenses solely to delay the closing for all licenses in an auction with a simultaneous closing rule. This will also ensure that the Commission can end the auction if it determines that the benefits from ending the auction, and hence issuing licenses more rapidly, exceeds the possible efficiency loss from cutting off bidding on a few low value licenses. If we exercise this option, we favor the use of three final rounds. Allowing more than one additional round provides some opportunity for counter-offers, thus reducing the risk that a license will not be awarded to the party that values it most highly.

49. Moreover, if this fail-safe mechanism is used, we will accept bids in the final round(s) only for licenses on which the highest bid increased in at least one of the preceding three rounds. No new bids will be accepted for other licenses.[25] There are two reasons not to take bids on licenses on which there has been no recent bidding. First, the fact that bidding on an individual license may close will provide an additional incentive to bid actively and thus speed the conclusion of the auction. If bids are accepted on all licenses in the final round(s) there is less cost to a bidder in holding back. Second, closing bidding on licenses for which activity has ceased ensures high bidders for those licenses that they will not lose a license without having an opportunity to make a counter-offer.[26] This reduces the uncertainty associated with aggregating licenses that are worth more as a package than individually. If final bids are accepted on all licenses, a high bidder on an aggregation of licenses may unexpectedly lose a critical part of the aggregation and have no chance to regain it except in the post-auction market, where bargaining or other transaction costs may be high.

4. Duration of Bidding Rounds

50. In simultaneous multiple round auctions for large numbers of interdependent high-value licenses, bidders may need a significant amount of time to evaluate back-up strategies and consult with their principals. For this reason, PacBell proposes one bidding round per day and PacTel proposes three business days per bidding round for broadband PCS.[27] We will provide bidders with a single business day to submit bids, and conduct one round of

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[25] See reply comments of PacBell, Appendix to attachment by Milgrom and Wilson at 5. See also Second Report and Order at ¶ 130, n. 106.

[26] Either the auction will close only when bidding ceases on all licenses, so the high bidder will have an opportunity to respond to any new bids, or the Commission will call for final bids but not accept new bids on licenses on which there have been no new bids in the previous three rounds, so no other bidder will have the opportunity to outbid the high bidder in a final round.

[27] Comments of PacBell, Attachment by Milgrom and Wilson at 19; comments of PacTel, Attachment by McAfee at 16.

bidding each business day.[28] However, we reserve the discretion to vary, by public notice or announcement, the duration of bidding rounds or the interval at which bids are accepted (e.g., run two or more rounds per day rather than one), in order to move the auction toward closure more quickly. We are more likely to conduct more than one round per day early in an auction than towards the end of an auction. At early stages of an auction prices will be low and contain relatively little information, so bidders will need less time to deliberate. It is in the final stages of an auction, when the consequences of bidding decisions are greatest, that bidders need the most time to deliberate. We will indicate either by Public Notice prior to an auction, or by announcement during an auction any changes to the duration of and intervals between bidding rounds.

5. Activity Rules

51. As discussed above, in order to ensure that simultaneous auctions with simultaneous stopping rules close within a reasonable period of time and to increase the information conveyed by bid prices during the auction, we believe that it is necessary to impose an activity rule to prevent bidders from waiting until the end of the auction before participating. Because simultaneous stopping rules generally keep all licenses open for bidding as long as anyone wishes to bid, they also create an incentive for bidders to hold back until prices approach equilibrium before making a bid. As noted above, this could lead to very long auctions. Delaying serious bidding until late in the auction also reduces the information content of prices during the course of an auction. Without an activity rule, bidders cannot know whether a low level of bidding on a license means that the license price is near its final level or if instead many serious bidders are holding back and may bid up the price later in the auction.[29] An activity rule is less important when licenses close one-by-one because failure to participate in any given round may result in losing the opportunity to bid at all, if that round turns out to be the last.

52. In the Second Report and Order we adopted the Milgrom-Wilson activity rule as our preferred activity rule where a simultaneous stopping rule is used. See Second Report and Order at ¶¶ 144-145. The Milgrom-Wilson approach encourages bidders to participate in early rounds by limiting their maximum participation to some multiple of their minimum participation level. Bidders are required to declare their maximum eligibility in terms of

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[28] With one round per day, the auction may take weeks to complete. This should not impose an excessive burden on bidders, however, because bids may be submitted by telephone or by a computer connected to a telephone line, so bidders need not have a representative in Washington throughout the auction.

[29] See ex parte presentation by Paul Milgrom on behalf of PacBell, June 21, 1994.

MHz-pops, and make an upfront payment equal to $0.02 per MHz-pop.[30] (See discussion of upfront payments infra.) That is, in each round bidders will be limited to bidding on licenses encompassing no more than the number of MHz-pops covered by their upfront payment. Licenses on which a bidder is the high bidder from the previous round count against this bidding limit. Under this approach, bidders will have the flexibility to shift their bids among any licenses for which they have applied so long as, within each round, the total MHz-pops encompassed by those licenses does not exceed the total number of MHz-pops on which they are eligible to bid. Bidders will be able to secure the option to participate at whatever maximum level they deem appropriate by making a sufficient upfront payment. To preserve their maximum eligibility, however, bidders will be required to maintain activity during each round of the auction. A bidder is considered active on a license in the current round if the bidder has submitted an acceptable bid for that license in the current round, or has the high bid for that license from the previous round, in which case, the bidder does not need to bid on that license in the current round to be considered active on that license.

53. Under the Milgrom-Wilson proposal, the minimum activity level, measured as a fraction of the bidder's eligibility in the current round, will increase during the course of the auction.[31] Milgrom and Wilson divide the auction into three stages. During the first stage of the auction, a bidder is required to be active on licenses encompassing one-third of the MHz-pops for which it is eligible. The "penalty" for falling below that activity level is a reduction in eligibility. At this stage, bidders will lose three MHz-pops in eligibility for each MHz-pop below the minimum required activity level.[32] In the second stage, bidders are required to be active on two-thirds of the MHz-pops for which they are eligible. The penalty for falling below that activity level is a loss of 1.5 MHz-pops in eligibility for each MHz-pop below the minimum required activity level. In the third stage, bidders are required to be active on licenses encompassing all of the MHz-pops for which they are eligible. The penalty for falling below that activity level is a loss of one MHz-pop in eligibility for each MHz-pop below the minimum required activity level. Thus in the final stage, each bidder retains eligibility (for the next round) equal to the MHz-pops for which it is an active bidder in the current round.

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[30] The number of "MHz-pops" is calculated by multiplying the population of the license service area by the amount of spectrum authorized by the license. We use the terms "per MHz-pop" and "per MHz per pop" interchangeably.

[31] Absent waivers (discussed infra), a bidder's eligibility (in terms of MHz-pops) in the current round is determined by the bidder's activity level and eligibility in the previous round. In the first round, however, eligibility is determined by the bidder's upfront payment and is equal to the upfront payment divided by $.02 per MHz-pop.

[32] An alternative way to state the rule for determining eligibility in stage I of an auction is that each bidder will be eligible to bid in the next round on three times the MHz-pops for which it is an active bidder in the current round, or the MHz-pops for which it is eligible in the current round, whichever is less.

54. The auction will start in stage I and move from stage I to stage II when, in each of three consecutive rounds of bidding, the high bid has increased on 10 percent or less of the spectrum (measured in terms of MHz-pops) being auctioned.[33] The auction will move from stage II to stage III when the high bid has increased on 5 percent or less of the spectrum being auctioned (measured in terms of MHz-pops), in each of three consecutive rounds of bidding in stage II.[34] In order to speed up an auction, the Commission may also announce, at any time after the initial 15 rounds, that the next stage of the auction (with a higher minimum participation level) will begin in the next bidding round.[35] Moreover, if as the Commission gains experience with auctions that use activity rules it determines that such auctions tend to move too slowly, it may, by public notice prior to a specific auction, increase the activity levels at which that auction moves between stages. Conversely, if the Commission determines that auctions tend to move too quickly, depriving bidders of sufficient time to deliberate and pursue back-up strategies, it may decrease the activity levels at which an auction moves between stages.

55. Finally, to avoid the consequences of clerical errors and to compensate for unusual circumstances that might delay a bidder's bid preparation or submission on a particular day, Milgrom and Wilson recommend permitting each bidder to request and

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[33] The transition rule may also be defined in terms of the "auction activity level" -- the sum of the MHz-pops of those licenses whose highest bid increased in the current round, as a percentage of the total MHz-pops of all licenses in that auction. (Note that this definition differs slightly from that used by Milgrom and Wilson. See reply comments by PacBell, Appendix to attachment by Milgrom and Wilson at 1.) The auction moves from stage I to stage II when the auction activity level is less than or equal to 10 percent for three consecutive rounds in stage I. The auction moves from stage II to stage III when the auction activity level is less than or equal to 5 percent for three consecutive rounds in stage II. For example, if two nationwide 30 MHz blocks of spectrum are put up for bid and the national population is approximately 250 million, a total of approximately 15,000 million MHz-pops would be available in the auction. If in stage I of the auction, the high bid increases on licenses encompassing less than 1,500 million MHz-pops for three consecutive rounds, the auction moves to stage II. This would be the case, for example, if in three consecutive rounds new bids were received on only a license for the New York MTA (26 million pops) and a license for the Los Angeles MTA (19 million pops), since the two licenses encompass a total of 1,350 million MHz-pops. Once in stage II, if in each of three consecutive rounds new acceptable bids are received on licenses encompassing less than 750 million MHz-pops, the auction would move to stage III.

[34] Once an auction is in stage II, it cannot revert to stage I. Once an auction is in stage III, it remains there.

[35] Moving to stage II prematurely might result in an auction moving too quickly to allow adequate time for consideration and may excessively limit the ability of bidders to pursue alternative backup strategies. See Second Report and Order at ¶ 142.

automatically receive a waiver of the activity rule once every three rounds. We believe that some waiver procedure is a critical element of the Milgrom-Wilson activity rule, since the Commission would not wish to reduce a bidder's eligibility due to an accidental act or circumstances not under the bidder's control.

56. We believe that the Milgrom-Wilson approach will best achieve the Commission's goals of affording bidders flexibility to pursue backup strategies, while at the same time ensuring that simultaneous auctions are concluded within a reasonable period of time. Accordingly, we plan to impose such an activity rule in conjunction with a simultaneous stopping rule to award higher value broadband PCS licenses. We intend, however, to use a simpler waiver procedure than that proposed by Milgrom and Wilson. We will permit bidders one automatic waiver from the activity rule during each stage of an auction. A waiver will permit a bidder to maintain its eligibility at the same level as in the round for which the waiver is submitted.[36] A waiver may be submitted either in the round in which bidding falls below the minimum required level to maintain (for the next round) the same eligibility as in that round, or prior to submitting a bid in the next round. If an activity rule waiver is entered in a round in which no other bidding activity occurs, the auction will remain open.[37] However, an activity rule waiver entered after a round in which no other bidding activity occurs will not reopen the auction. If, as we gain both experimental and actual auction experience, we determine that permitting one automatic waiver per auction stage is insufficient to prevent the inadvertent reduction in eligibility of serious bidders , we may, by public notice prior to a specific broadband auction, increase the number of automatic activity rule waivers, or instead allow one automatic waiver during a specified number of bidding rounds.

57. Furthermore, if, as we gain experience with auctions, we determine that the Milgrom-Wilson three stage activity rule is too complicated or costly to administer, we may alternatively impose a less complex activity rule. See Second Report and Order at ¶ 144. We will announce by Public Notice before each auction the activity rule that will be employed in that particular auction.

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[36] An activity rule waiver cannot be used to correct an error in the amount bid.

[37] If, however, we determine, based on evidence from experimental and actual auctions, that this is likely to excessively delay the close of an auction or result in other adverse strategic manipulation of an auction, we may announce by public notice prior to a specific broadband auction that submission of a waiver will not keep an auction open under any circumstances.